

IBS growth and transverse coupling

J. Wei

BNL

RHIC Beam Experiment Proposal

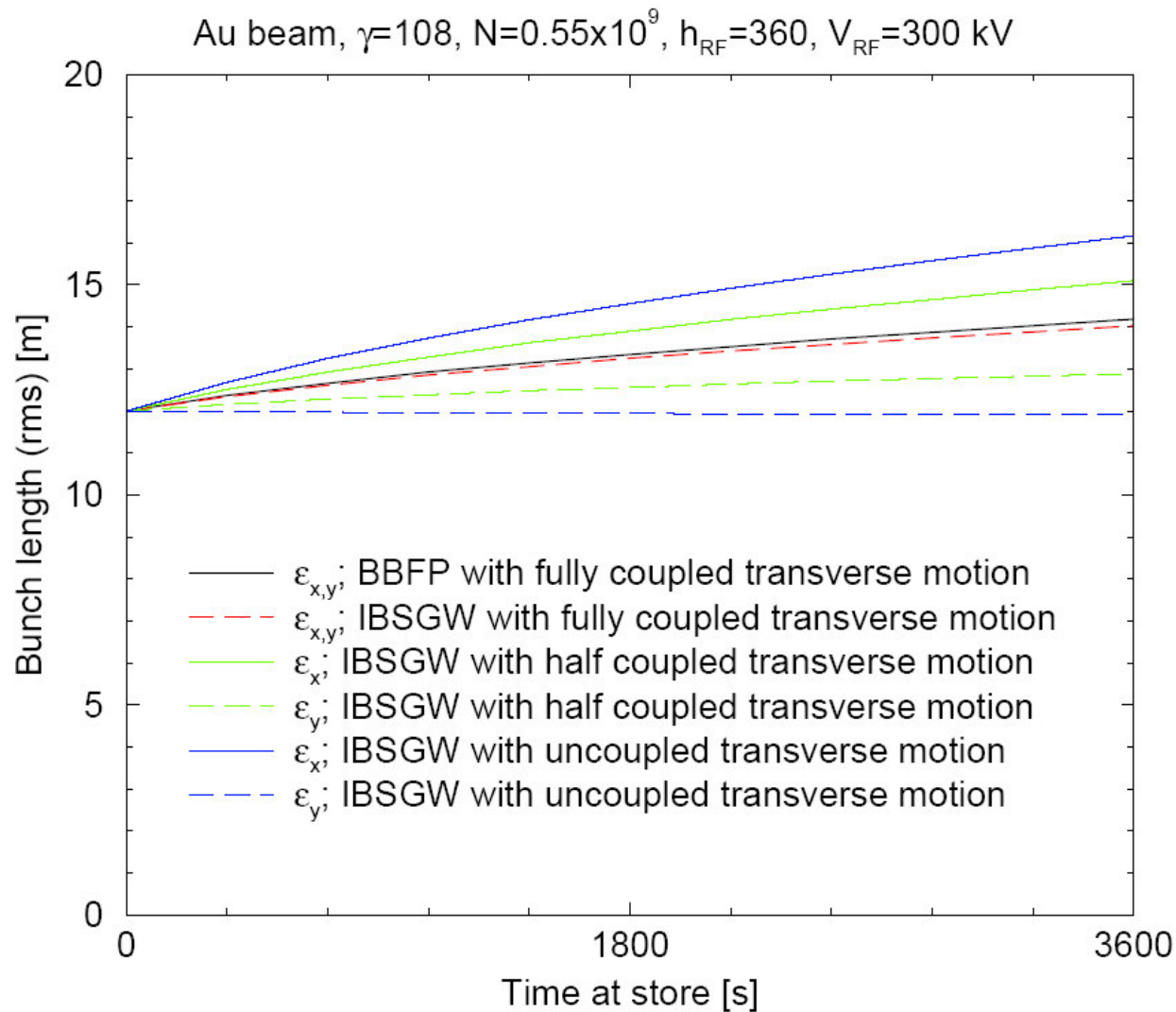
November 6, 2004



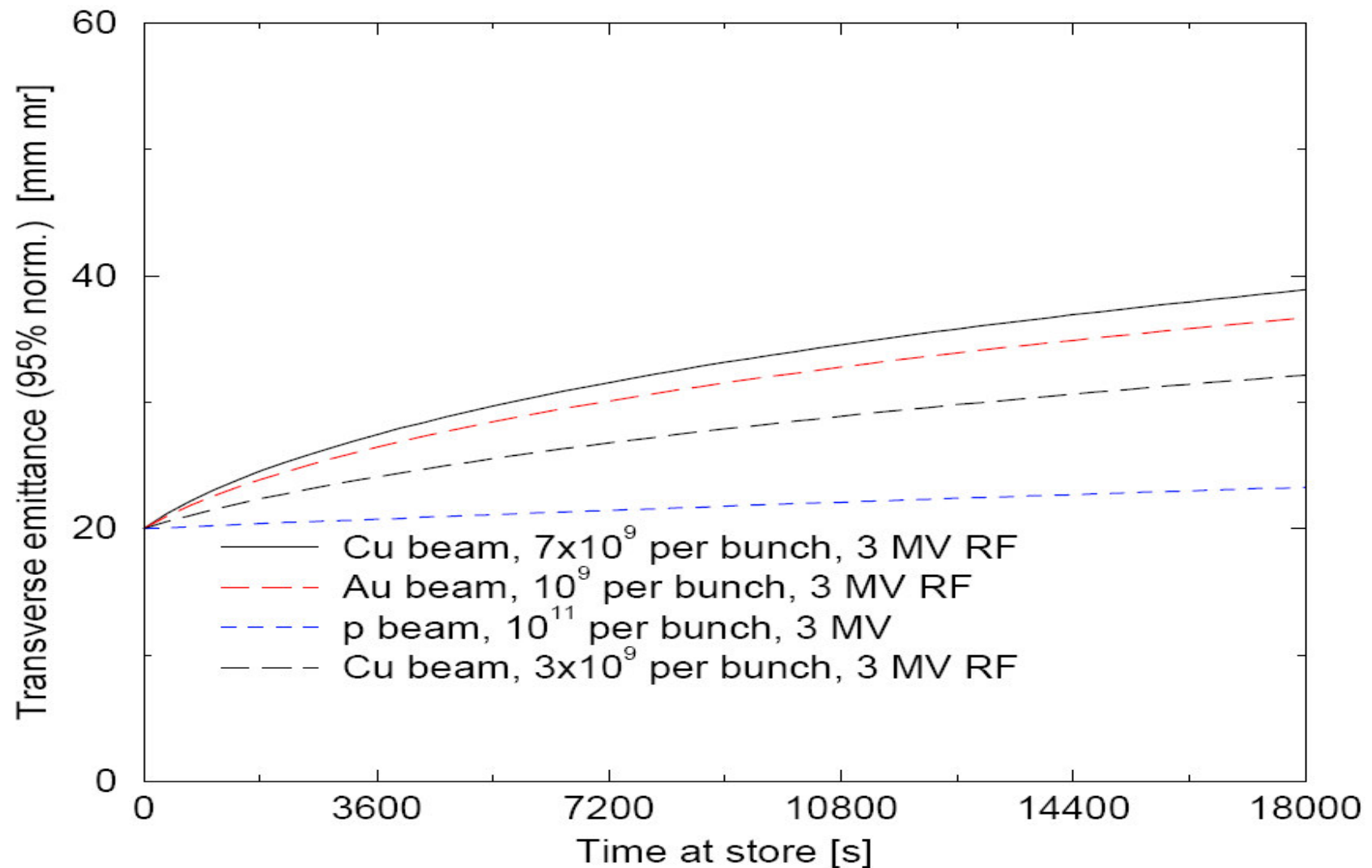
Introduction

- What has been accomplished?
 - IBS growth rate bench-marked for store, assuming full transverse coupling; only vertical IPM data used
 - IBS beam loss bench-marked for store
 - IBS Gaussian vs. hollow beam evolution bench-marked for store
 - Publication: HB2004 talk & paper; journal paper in preparation; PAC2005 abstract under preparation
- What needs to be done?
 - Dependence of IBS growth on transverse coupling
 - Bench-marking for injection – codes to be improved; data to be analyzed
 - Dependence of IBS growth on dispersion – needs more lattice study & preparation before the proposal
- What are we proposing?
 - First on coupling dependence of IBS growth

Transverse coupling & IBS growth



Comparison of Cu and Au operations



IBS coupling dependence study proposal

- **Team:**
 - J. Wei, A. Fedotov, J. Beebe-Wang, R. Connolly, W. Fischer, V. Ptitsin, S. Tepikian, K. Vetter ...
- **Time needed: 6 hours total**
 - 3 hour for decoupling/coupling set-up
 - 1.5 hour each for IBS measurements: decoupled & fully coupled
- **Brief procedure:**
 - Beam at store, preferable with $h=360$ RF, without rebucketing
 - Perform global decoupling by minimizing the tune split
 - If necessary, local decoupling at the triplets
 - Measure IBS growth with IPM and WCM
 - Repeat the measurement under fully coupled condition

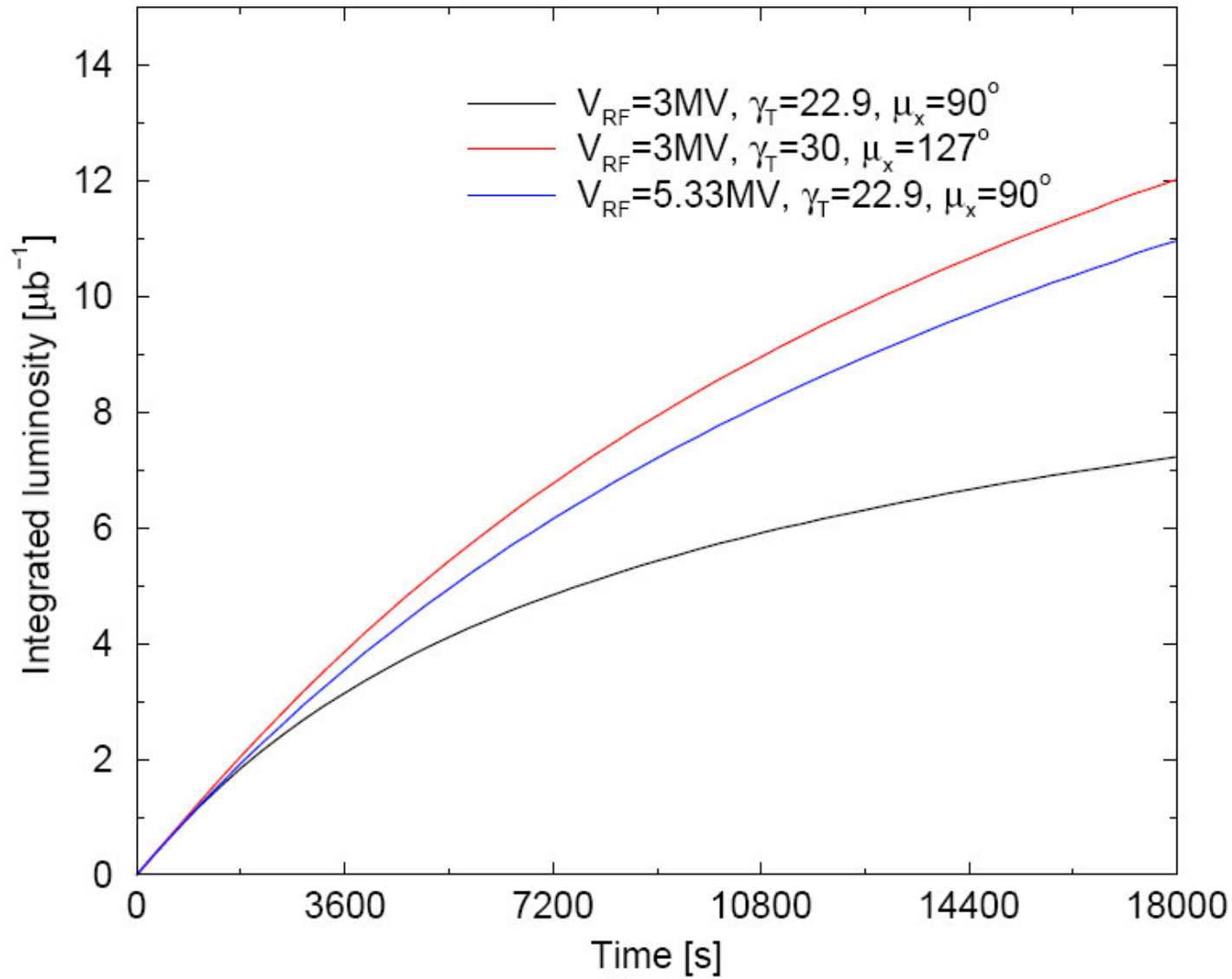
Instrumentations

- Needed instrumentation:
 - IPM, WCM, skew quad families, triplet skew correctors, tune meter, BPM, Schottky emittance measurement
- Calibration of IPM
 - Cross check with luminosity data
 - Cross check with Schottky emittance measurement

Future dispersion studies

- Vladimir's proposal of increased FODO cell focusing
 - Potentially raise luminosity by $\sim 67\%$ if the phase advance is raised from 90 to 127 degrees per cell
 - » Reduced dispersion, reduced transverse growth
 - » Increased transition energy, and RF bucket area
 - » Better than a simple increase of RF voltage
 - Needs revised transition jump scheme
 - Needs study on chromatic compensation
- Transition jump optimization
 - Original scheme optimized for 90 degree per cell
 - To increase the present phase advance, may consider increase both horizontal and vertical integer tunes by 1

Integrated luminosity in 5 hour store



September 16-17, 2004